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<223> Description of Artificial Sequence: Plasmid

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<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: pGM716 with deletion of HpaI fragment
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<220>

<223> Description of Artificial Sequence: udp and deoD cloned in pUC18 so to create a fusion between the two proteins

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<210> 10
<211> 6299
<212> DNA
<213> Artificial Sequence
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<223> Description of Artificial Sequence: udp and deoD cloned in pUC18 so to create a fusion between the two proteins bonded to each other via an aa linker

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<211> 2297

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: cloning vector derived from pUC18

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cccgtagaaa agatcaaagg atcttcttga gatccttttt ttctgcgcgt aatctgctgc 1560
ttgcaaacaa aaaaaccacc gctaccagcg gtggtttgtt tgccggatca agagctacca 1620
actettttte egaaggtaae tggetteage agagegeaga taccaaatae tgteetteta 1680
```

: 1°

```
gtgtagcegt agttaggcca ccacttcaag aactetgtag cacegectac ataceteget 1740 ctgetaatec tgttaceagt ggetgetgee agtggegata agtegtget tacegggttg 1800 gacteaagae gatagttace ggataaggeg cageggtegg getgaacggg gggttegtge 1860 acacagecca gettggageg aacgacetae acegaactga gatacetaca gegtgageta 1920 tgagaaaggeg ccacgettee egaagggaga aaggeggaca ggtateeggt aageggagg 1980 gteggaacag gagagegae gagggaget eeagggggaa aegeetggta tetttatagt 2040 cetgtegggt teegeeacet etgacetgag egetgattt tgtgatgete gteagggggg 2100 eggageetat ggaaaaacge eageaacgeg geettttae ggtteetgge ettttgetg 2160 eettttgete acatgttett teetgegtta teeeetgat etgtggataa eegtattaee 2220 geetttgagt eggaaga eggaaga eggaaga eggaaga
```

<210> 12

<211> 3031

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: udp and deoD cloned into pGM746 without upstream ptac promoter

<400> 12 gegeecaata egeaaacege eteteceege gegttggeeg atteattaat geagaatteg 60 agctcggtac ccggggatcc tagcaggagg gaattettec atggetacce cacacattaa 120 tgcagaaatg ggcgatttcg ctgacgtagt tttgatgcca ggcgacccgc tgcgtgcgaa 180 gtatattgct gaaactttcc ttgaagatgc ccgtgaagtg aacaacgttc gcggtatgct 240 gggcttcacc ggtacttaca aaggccgcaa aatttccgta atgggtcacg gtatgggtat 300 cocqtcctqc tocatctaca ccaaaqaact gatcaccgat ttcgqcqtga agaaaattat 360 ccgcgtgggt tcctgtggcg cagttctgcc gcacgtaaaa ctgcgcgacg tcgttatcgg 420 tatqqqtqcc tqcaccqatt ccaaaqttaa ccgcatccqt tttaaagacc atgactttgc 480 cgctatcgct gacttcgaca tggtgcgtaa cgcagtagat gcagctaaag cactgggtat 540 tgatgctcgc gtgggtaacc tgttctccgc tgacctgttc tactctccgg acggcgaaat 600 gttcgacgtg atggaaaaat acggcattct cggcgtggaa atggaagcgg ctggtatcta 660 cggcgtcgct gcagaatttg gcgcgaaagc cctgaccatc tgcaccgtat ctgaccacat 720 ccgcactcac gagcagacca ctgccgctga gcgtcagact accttcaacg acatgatcaa 780 aatcgcactg gaatccgttc tgctgggcga taaagagtaa gtcgacctgc aggcatgcaa 840 gettatggtg cacteteagt acaatetget etgatgeege atagttaage cageceegae 900 accegecaac accegetgac gegecetgac gggettgtet geteceggea teegettaca 960 gacaagetgt gacegtetee gggagetgea tgtgteagag gtttteaceg teateacega 1020 aacgogcgag acgaaagggc ctcgtgatac gcctattttt ataggttaat gtcatgataa 1080 taatggtttc ttagacgtca ggtggcactt ttcggggaaa tgtgcgcgga accectattt 1140 gtttattttt ctaaatacat tcaaatatgt atccgctcat gagacaataa ccctgataaa 1200 tgcttcaata atattgaaaa aggaagagta tgagtattca acatttccgt gtcgccctta 1260 ttcccttttt tgcggcattt tgccttcctg tttttgctca cccagaaacg ctggtgaaag 1320 taaaagatgc tgaagatcag ttgggtgcac gagtgggtta catcgaactg gatctcaaca 1380 geggtaagat eettgagagt tttegeeeeg aagaaegttt teeaatgatg ageaetttta 1440 aagttotgot atgtggogog gtattatooc gtattgacgo ogggoaagag caactoggto 1500

```
geogeataca etatteteag aatgaettgg ttgagtaete accagteaca gaaaageate 1560
ttacggatgg catgacagta agagaattat gcagtgctgc cataaccatg agtgataaca 1620
ctgcggccaa cttacttctq acaacqatcg gaggaccgaa ggagctaacc gcttttttgc 1680
acaacatggg ggatcatgta actcgccttg atcgttggga accggagctg aatgaagcca 1740
taccaaacga cgagcgtgac accacgatgc ctgtagcaat ggcaacaacg ttgcgcaaac 1800
tattaactgg cgaactactt actctagctt cccggcaaca attaatagac tggatggagg 1860
eggataaagt tgeaggacea ettetgeget eggecettee ggetggetgg tttattgetg 1920
ataaatctqq aqccqqtqaq cqtqqqtctc qcqqtatcat tqcaqcactq qqqccaqatq 1980
qtaaqccctc ccqtatcqta qttatctaca cqacqqqqaq tcaqqcaact atqqatqaac 2040
gaaatagaca gatcgctgag ataggtgcct cactgattaa gcattggtaa ctgtcagacc 2100
aagtttactc atatatactt tagattgatt taaaacttca tttttaattt aaaaggatct 2160
aggtgaagat cctttttgat aatctcatga ccaaaatccc ttaacgtgag ttttcgttcc 2220
actgagegte agacceegta gaaaagatea aaggatette ttgagateet ttttttetge 2280
gcgtaatctg ctgcttgcaa acaaaaaaac caccgctacc agcggtggtt tgtttgccgg 2340
atcaagagct accaactctt tttccgaagg taactggctt cagcagagcg cagataccaa 2400
atactgteet tetagtgtag cegtagttag gecaecactt caagaactet gtageacege 2460
ctacatacct cgctctgcta atcctgttac cagtggctgc tgccagtggc gataagtcgt 2520
qtcttaccqq qttqqactca agacqataqt taccqqataa ggcgcagcgg tcgggctgaa 2580
cggggggttc gtgcacacag cccagcttgg agcgaacgac ctacaccgaa ctgagatacc 2640
tacagcgtga gctatgagaa agcgccacgc ttcccgaagg gagaaaggcg gacaggtatc 2700
cggtaagcgg cagggtcgga acaggagagc gcacgaggga gcttccaggg ggaaacgcct 2760
ggtatettta tagteetgte gggtttegee acctetgaet tgagegtega tttttgtgat 2820
gctcgtcagg ggggcggagc ctatggaaaa acgccagcaa cgcggccttt ttacggttcc 2880
tggccttttg ctggcctttt gctcacatgt tctttcctgc gttatcccct gattctgtgg 2940
ataaccgtat taccgccttt gagtgagetg ataccgctcg ccgcagccga acgaccgage 3000
                                                                  3031
gcagcgagtc agtgagcgag gaagcggaag a
```

```
<210> 13
<211> 3128
<212> DNA
<213> Artificial Sequence
```

<223> Description of Artificial Sequence: deoD cloned
 downstream ptac promoter

```
<400> 13
gegeccaata egeaaacege eteteceege gegttggeeg atteattaat geagaatteg 60
ageteegaca teataacggt tetggeaaat attetgaaat gagetgttga caattaatea 120
teggetegta taatgtgtgg aattgtgage ggataacaat tteacacagg aggateetag 180
caggagggaa teetteeatg getaceecae acattaatge agaaatggge gatttegetg 240
acgtagtttt gatgeeagge gaccegetge gtgegaagta tattgetgaa acttteettg 300
aagatgeeeg tgaagtgaac aacgttegeg gtatgetggg etteaceggt acttacaaag 360
geegeaaaat tteegtaatg ggteaceggta tgggtateee gteetgetee atetacacea 420
aagaactgat cacegattee ggegtgaaga aaattateeg egtggttee tgtggegeag 480
ttetgeegea egtaaaactg egegaegteg ttateggtat gggtgeetge acegatteea 540
aagttaaceg cateegttt aaagaceatg actttgeege tategetgae ttegaeatgg 600
```

tgcgtaacgc	agtagatgca	gctaaagcac	tgggtattga	tgctcgcgtg	ggtaacctgt	660
tctccgctga	cctgttctac	tctccggacg	gcgaaatgtt	cgacgtgatg	gaaaaatacg	720
gcattctcgg	cgtggaaatg	gaagcggctg	gtatctacgg	cgtcgctgca	gaatttggcg	780
cgaaagccct	gaccatctgc	accgtatctg	accacatecg	cactcacgag	cagaccactg	840
ccgctgagcg	tcagactacc	ttcaacgaca	tgatcaaaat	cgcactggaa	tccgttctgc	900
tgggcgataa	agagtaagtc	gacctgcagg	catgcaagct	tatggtgcac	tctcagtaca	960
atctgctctg	atgccgcata	gttaagccag	ccccgacacc	cgccaacacc	cgctgacgcg	1020
ccctgacggg	cttgtctgct	cccggcatcc	gcttacagac	aagctgtgac	cgtctccggg	1080
agctgcatgt	gtcagaggtt	ttcaccgtca	tcaccgaaac	gcgcgagacg	aaagggcctc	1140
gtgatacgcc	tatttttata	ggttaatgtc	atgataataa	tggtttctta	gacgtcaggt	1200
ggcacttttc	ggggaaatgt	gcgcggaacc	cctatttgtt	tatttttcta	aatacattca	1260
aatatgtatc	cgctcatgag	acaataaccc	tgataaatgc	ttcaataata	ttgaaaaagg	1320
aagagtatga	gtattcaaca	tttccgtgtc	gcccttattc	ccttttttgc	ggcattttgc	1380
cttcctgttt	ttgctcaccc	agaaacgctg	gtgaaagtaa	aagatgctga	agatcagttg	1440
ggtgcacgag	tgggttacat	cgaactggat	ctcaacagcg	gtaagatcct	tgagagtttt	1500
cgccccgaag	aacgttttcc	aatgatgagc	acttttaaag	ttctgctatg	tggcgcggta	1560
ttatcccgta	ttgacgccgg	gcaagagcaa	ctcggtcgcc	gcatacacta	ttctcagaat	1620
gacttggttg	agtactcacc	agtcacagaa	aagcatctta	cggatggcat	gacagtaaga	1680
gaattatgca	gtgctgccat	aaccatgagt	gataacactg	cggccaactt	acttctgaca	1740
acgatcggag	gaccgaagga	gctaaccgct	tttttgcaca	acatggggga	tcatgtaact	1800
cgccttgatc	gttgggaacc	ggagctgaat	gaagccatac	caaacgacga	gcgtgacacc	1860
acgatgcctg	tagcaatggc	aacaacgttg	cgcaaactat	taactggcga	actacttact	1920
ctagcttccc	ggcaacaatt	aatagactgg	atggaggcgg	ataaagttgc	aggaccactt	1980
ctgcgctcgg	cccttccggc	tggctggttt	attgctgata	aatctggagc	cggtgagcgt	2040
gggtctcgcg	gtatcattgc	agcactgggg	ccagatggta	agccctcccg	tatcgtagtt	2100
atctacacga	cggggagtca	ggcaactatg	gatgaacgaa	atagacagat	cgctgagata	2160
ggtgcctcac	tgattaagca	ttggtaactg	tcagaccaag	tttactcata	tatactttag	2220
		ttaatttaaa				
		acgtgagttt				
		agatcctttt				
		ggtggtttgt				
		cagagcgcag				
		gaactctgta				
		cagtggcgat				
		gcagcggtcg				
		caccgaactg				
		aaaggcggac				
		tccaggggga				
		gcgtcgattt				
		ggccttttta				
		atcccctgat				
	ccgctcgccg	cagccgaacg	accgagcgca	gcgagtcagt	gagcgaggaa	
gcggaaga						3128

<210> 14 <211> 3934

<212> DNA

<223> Description of Artificial Sequence: udp and deoD cloned downstream ptac promoter

<400> 14 qcqcccaata cqcaaaccqc ctctccccqc qcqttqqccq attcattaat qcaqaattcq 60 agetecgaea teataaeggt tetggeaaat attetgaaat gagetgttga caattaatea 120 teggetegta taatgtgtgg aattgtgage ggataacaat tteacacagg aggatectag 180 caqqaqqqaa ttcttccatg gctaccccac acattaatgc agaaatgggc gatttcgctg 240 acqtaqtttt gatgccaggc gacccgctgc gtgcgaagta tattgctgaa actttccttg 300 aaqatqcccq tqaaqtgaac aacgttcgcg gtatgctggg cttcaccggt acttacaaag 360 geogeaaaat tteegtaatg ggteaeggta tgggtateee gteetgetee atetaeaeea 420 aagaactgat caccgattto ggcgtgaaga aaattatoog cgtgggttoo tgtggcgcag 480 ttctgccgca cgtaaaactg cgcgacgtcg ttatcggtat gggtgcctgc accgattcca 540 aagttaaccg catccgtttt aaagaccatg actttgccgc tatcgctgac ttcgacatgg 600 tgcgtaacgc agtagatgca gctaaagcac tgggtattga tgctcgcgtg ggtaacctgt 660 totocgetga cotgttotac totocggacg gogaaatgtt cgacgtgatg gaaaaatacg 720 gcattctcgg cgtggaaatg gaagcggctg gtatctacgg cgtcgctgca gaatttggcg 780 cgaaagccct gaccatctgc accgtatctg accacatccg cactcacgag cagaccactg 840 ccgctgagcg tcagactacc ttcaacgaca tgatcaaaat cgcactggaa tccgttctgc 900 tgggcgataa agagtaagtc gacacaggaa acagctatga ccatgattac gaattcgagc 960 teggtaccat ccatgtccaa gtetgatgtt tttcateteg geetcactaa aaacgattta 1020 caaggggeta cgcttgccat cgtccctggc gacccggatc gtgtggaaaa gatcgccgcg 1080 ctgatggata agccggttaa gctggcatct caccgcgaat tcactacctg gcgtgcagag 1140 ctggatggta aacctgttat cgtctgctct accggtatcg gcggcccgtc tacctctatt 1200 gctgttgaag agctggcaca gctgggcatt cgcaccttcc tgcgtatcgg tacaacgggc 1260 getattcage egeatattaa tgtgggtgat gteetggtta ceaeggegte tgteegtetg 1320 gatggcgcga gcctgcactt cgcaccgctg gaattcccgg ctgtcgctga tttcgaatgt 1380 acgactgcgc tggttgaagc tgcgaaatcc attggcgcga caactcacgt tggcgtgaca 1440 gettettetg atacetteta eccaggicag gaacgitacg atacttacte tggtegegta 1500 gttcgtcact ttaaaggttc tatggaagag tggcaggcga tgggcgtaat gaactatgaa 1560 atggaatctg caaccetget gaccatgtgt gcaagtcagg geetgegtge eggtatggta 1620 gegggtgtta tegttaaceg cacecageaa gagateeega atgetgagae gatgaaacaa 1680 accgaaagcc atgcggtgaa aatcgtggtg gaagcggcgc gtcgtctgct gtaattetet 1740 taagettatg gtgcactete agtacaatet getetgatge egeatagtta ageeageeee 1800 gacaccegee aacacceget gacgegeet gacgggettg tetgeteeeg geateegett 1860 acagacaage tgtgacegte teegggaget geatgtgtea gaggttttea eegteateae 1920 cgaaacgcgc gagacgaaag ggcctcgtga tacgcctatt tttataggtt aatgtcatga 1980 taataatggt ttcttagacg tcaggtggca cttttcgggg aaatgtgcgc ggaaccccta 2040 tttgtttatt tttctaaata cattcaaata tgtatccgct catgagacaa taaccctgat 2100 aaatgcttca ataatattga aaaaggaaga gtatgagtat tcaacatttc cgtgtcgccc 2160 ttattccctt ttttgcggca ttttgccttc ctgtttttgc tcacccagaa acgctggtga 2220 aagtaaaaga tgctgaagat cagttgggtg cacgagtggg ttacatcgaa ctggatctca 2280 acageggtaa gateettgag agttttegee eegaagaaeg tttteeaatg atgageaett 2340 ttaaagttet getatgtgge geggtattat eeegtattga egeegggeaa gageaacteg 2400 gtcgccgcat acactattct cagaatgact tggttgagta ctcaccagtc acagaaaagc 2460

```
atcttacgga tggcatgaca gtaagagaat tatgcagtgc tgccataacc atgagtgata 2520
acactgcggc caacttactt ctgacaacga tcggaggacc gaaggagcta accgcttttt 2580
tgcacaacat gggggatcat gtaactcgcc ttgatcgttg ggaaccggag ctgaatgaag 2640
ccataccaaa cgacgagcgt gacaccacga tgcctgtagc aatggcaaca acgttgcgca 2700
aactattaac tggcgaacta cttactctag cttcccggca acaattaata gactggatgg 2760
aggoggataa agttgcagga ccacttctgc gctcggccct tccggctggc tggtttattg 2820
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atggtaagcc ctcccgtatc gtagttatct acacgacggg gagtcaggca actatggatg 2940
aacgaaatag acagatcgct gagataggtg cctcactgat taagcattgg taactgtcag 3000
accaagttta ctcatatata ctttagattg atttaaaact tcatttttaa tttaaaagga 3060
tctaggtgaa gatccttttt gataatctca tgaccaaaat cccttaacgt gagttttcgt 3120
tocactgage gtcagacccc gtagaaaaga tcaaaggate ttettgagat cettttttte 3180
tgcgcgtaat ctgctgcttg caaacaaaaa aaccaccgct accagcggtg gtttgtttgc 3240
cggatcaaga gctaccaact cttttccga aggtaactgg cttcagcaga gcgcagatac 3300
caaataotgt cettetagtg tageegtagt taggeeacca etteaagaae tetgtageae 3360
cgcctacata cctcgctctg ctaatcctgt taccagtggc tgctgccagt ggcgataagt 3420
cgtgtcttac cgggttggac tcaagacgat agttaccgga taaggcgcag cggtcgggct 3480
gaacgggggg ttcgtgcaca cagcccagct tggagcgaac gacctacacc gaactgagat 3540
acctacagcg tgagctatga gaaagcgcca cgcttcccga agggagaaag gcggacaggt 3600
atccggtaag cggcagggtc ggaacaggag agcgcacgag ggagcttcca gggggaaacg 3660
cctggtatct ttatagtcct gtcgggtttc gccacctctg acttgagcgt cgatttttgt 3720
gatgctcgtc aggggggcgg agcctatgga aaaacgccag caacgcggcc tttttacggt 3780
tectggeett ttgetggeet tttgeteaca tgttetttee tgegttatee eetgattetg 3840
tggataaccg tattaccgcc tttgagtgag ctgataccgc tcgccgcagc cgaacgaccg 3900
                                                                   3934
agcgcagcga gtcagtgagc gaggaagcgg aaga
```

```
<210> 15
<211> 6046
<212> DNA
<213> Artificial Sequence
```

<223> Description of Artificial Sequence: udp and deoD
 cloned downstream ptac promoter

```
<400> 15
gcgcccaata cgcaaaccgc ctctccccgc gcgttggccg attcattaat gcagaattcg 60
agctccgaca tcataacggt tctggcaaat attctgaaat gagctgttga caattaatca 120
tcggctcgta taatgtgtgg aattgtgagc ggataacaat ttcacacagg aggatcctag 180
caggagggaa ttcttccatg gctaccccac acattaatgc agaaatgggc gatttcgctg 240
acgtagtttt gatgccaggc gacccgctgc gtgcgaagta tattgctgaa actttccttg 300
aagatgcccg tgaagtgaac aacgttcgcg gtatgctggg cttcaccggt acttacaaag 360
gccgcaaaat ttccgtaatg ggtcacggta tgggtatccc gtcgtccc atctacacaa 420
aagaactgat caccgatttc ggcgtgaaga aaattatccg cgtggttcc tgtggcgcag 480
ttctgccgca cgtaaaactg cgcgacgtcg ttatcggtat gggtgcctgc accgattcca 540
aagttaaccg catccgttt aaagaccatg actttgccgc tatcgctg ggtaacctgt 660
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